USER GUIDE AND TERMINAL BLOCK SPECIFICATIONS

NI PXIe-4339 and RM-4339

NI PXIe-4339, 8 Ch, 24-Bit, Bridge and Voltage Input Module, RM-4339 Rack-Mount Terminal Block

Français Deutsch 日本語 한국어 简体中文

ni.com/manuals

This document explains how to install, configure, and set up the NI PXIe-4339 SC Express universal bridge module and RM-4339 rack-mount terminal block. Driver support for the NI PXIe-4339 was first available in NI-DAQmx 14.2. Driver support for the RM-4339 was first available in NI-DAQmx 14.5. For the list of devices supported by a specific release, refer to the *NI-DAQmx Readme*, available on the version-specific download page or installation media.

Note The keying of these terminal blocks prevents them from connecting to other modules that could be damaged by the voltage present on the terminal block. However, you should only use these terminal blocks with their supported modules.

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Electromagnetic Compatibility Guidelines

This product was tested and complies with the regulatory requirements and limits for electromagnetic compatibility (EMC) stated in the product specifications. These requirements and limits provide reasonable protection against harmful interference when the product is operated in the intended operational electromagnetic environment.

This product is intended for use in industrial locations. However, harmful interference may occur in some installations, when the product is connected to a peripheral device or test object, or if the product is used in residential or commercial areas. To minimize interference with radio and television reception and prevent unacceptable performance degradation, install and use this product in strict accordance with the instructions in the product documentation.

Furthermore, any modifications to the product not expressly approved by National Instruments could void your authority to operate it under your local regulatory rules.

Caution To ensure the specified EMC performance, operate this product only with shielded cables and accessories.

What You Need to Get Started

To set up and use the RM-4339 rack-mount terminal block with the NI PXIe-4339 module, you need the following items:

- Hardware
  - RM-4339 rack-mount terminal block
  - NI PXIe-4339 module
  - PXIe chassis
  - SCAL-4339 Shunt Calibration Accessory (optional)
  - 19 in. rack to accommodate the RM-4339 and PXIe chassis
  - Four screws (not supplied by NI) suitable for your application to mount the RM-4339 in the rack
  - SH96-96-2 cable and included standoffs, which are used to mount the cable to the module
  - Rack-mount kit (as required for your application) for mounting the PXIe chassis in the 19 in. rack
  - Cabling and sensors as required for your application
- Tools
  - Phillips-head screwdrivers as required by your application
  - Flathead screwdrivers as required by your application
  - Long-nose pliers
  - Wire cutter
  - Wire insulation stripper
  - RJ50 terminal crimper
- Documentation
  - NI PXIe-4339 and RM-4339 User Guide and Terminal Block Specifications
  - *Read Me First: Safety and Electromagnetic Compatibility*
  - *NI PXIe-4339 User Manual*
  - PXIe chassis user manual

You can download needed documents from `ni.com/manuals`.

Installation

Install the Software

Note You must be an administrator to install NI software and devices on your computer.

Ensure that the following software is installed before installing the SC Express hardware:

1. Your application software, such as LabVIEW, LabWindows™/CVI™ or .NET.
2. NI-DAQmx—NI PXIe-4339 modules were first supported in NI-DAQmx 14.2. RM-4339 terminal blocks were first supported in NI-DAQmx 14.5.

Note For detailed NI software version support, refer to the *NI-DAQmx Readme*. Back up any applications before upgrading software or modifying the application.

Unpack and Install the Module

Remove the packaging and inspect the module. Contact NI if the module is damaged. Do not install a damaged module.

Caution The module is static sensitive. Always properly ground yourself and the equipment when handling or connecting to the module.

Complete the following steps to install the NI SC Express module while referring to Figures 1 and 2:

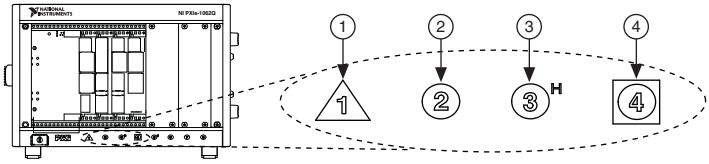
Note To maintain forced air cooling in the PXIe system, refer to the *Maintain Forced-Air Cooling* document.

1. Make sure the chassis is powered off.
2. Connect the power cord to your chassis and then plug it into the power supply receptacle before installing the NI PXIe-4339. The power cord grounds the chassis and protects it from electrical damage while you install the module.

Caution To protect yourself, the chassis, and the NI PXIe-4339 from electrical hazards, leave the chassis powered off until you complete the NI PXIe-4339 module installation.

3. Identify a supported PXI Express slot in the chassis. SC Express devices can be placed only in PXI Express Peripheral slots, PXI Express Hybrid Peripheral slots, and PXI Express System Timing slots. Refer to the chassis documentation for details.

Figure 1. Symbols for PXI Express/PXI Express Hybrid/PXI Slots



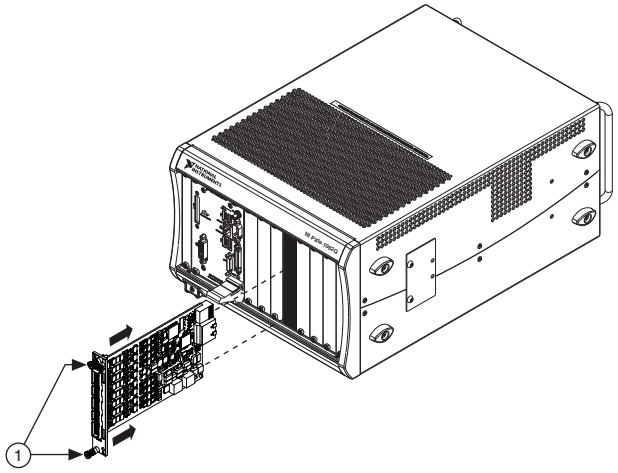
1	PXI Express System Controller Slot	3	PXI Express Hybrid Peripheral Slot
2	PXI Peripheral Slot	4	PXI Express System Timing Slot

4. Remove the filler panel, and touch any metal part of the chassis to discharge static electricity.
5. Place the module edges into the module guides at the top and bottom of the slot.

Caution When installing the module, make sure both edges are positioned inside the guides and that the module components do not come into contact with adjacent modules.

6. Slide the module along the guides until it reaches the rear connector then seat the module by pushing the front panel until it is flush with the front panel of the chassis.
7. Secure the module to the chassis using the front-panel captive screws, shown in Figure 2. Tighten the screws to 0.31 N · m (2.7 lb · in.).

Figure 2. Installing NI PXIe-4339 Modules



1	Captive Screws

Unpack and Install the Rack-Mount Terminal Block, Chassis, and Cables

Remove the packaging and inspect the terminal block, chassis, and cables. Contact NI if there is any damage. Do not install a damaged product.

Caution The module and terminal block are static sensitive. Always properly ground yourself and the equipment when handling or connecting to the module and terminal block.

Caution Refer to the *Read Me First: Safety and Electromagnetic Compatibility* document before removing equipment covers or connecting or disconnecting any signal wires.

Caution Do not supply hazardous voltages (>30 V_{rms}/42.4 V_{pk}/60 VDC) to the terminal block.

Caution To ensure the EMC performance specified for the connected NI PXIe-4339 module, operate this product only with shielded RJ50 and BNC cables.

Note The chassis can be powered on or off when connecting the terminal block.

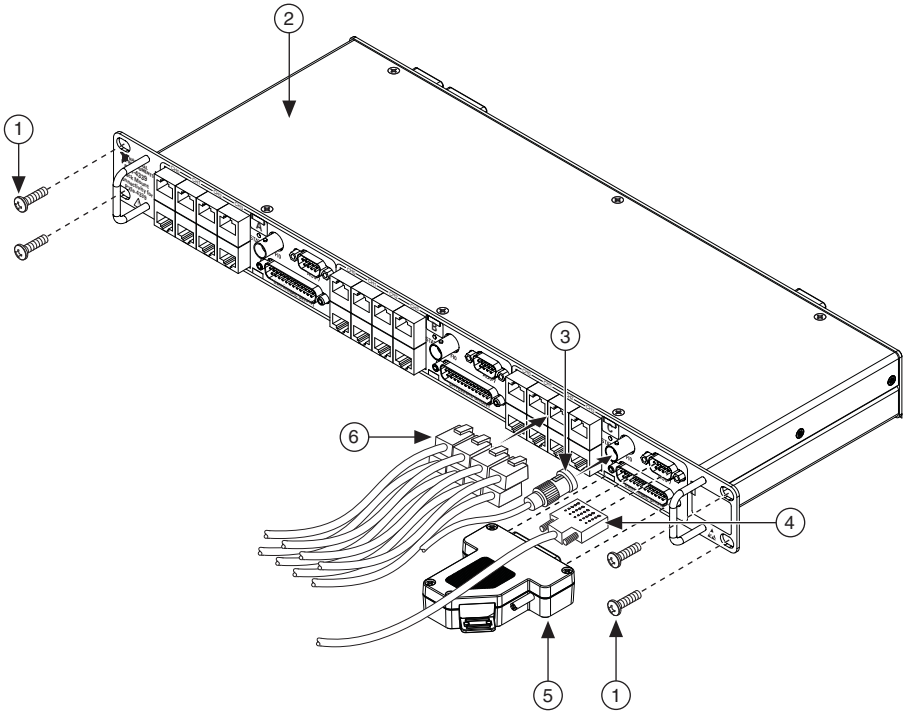
To install the rack-mount terminal block into the rack, complete the following steps while referring to Figure 3.

1. Place the RM-4339 in the desired position.
2. Install and tighten the four rack-mounting screws.

If the chassis is not already installed in the rack, complete the following steps:

1. Attach the PXIe chassis rack-mount hardware to the PXIe chassis. Refer to your rack-mount kit installation guide for more details.
2. Mount the PXIe chassis in the rack in the desired position. Refer to your rack-mount kit installation guide for more details.

Figure 3. RM-4339 Installation and Front Connections



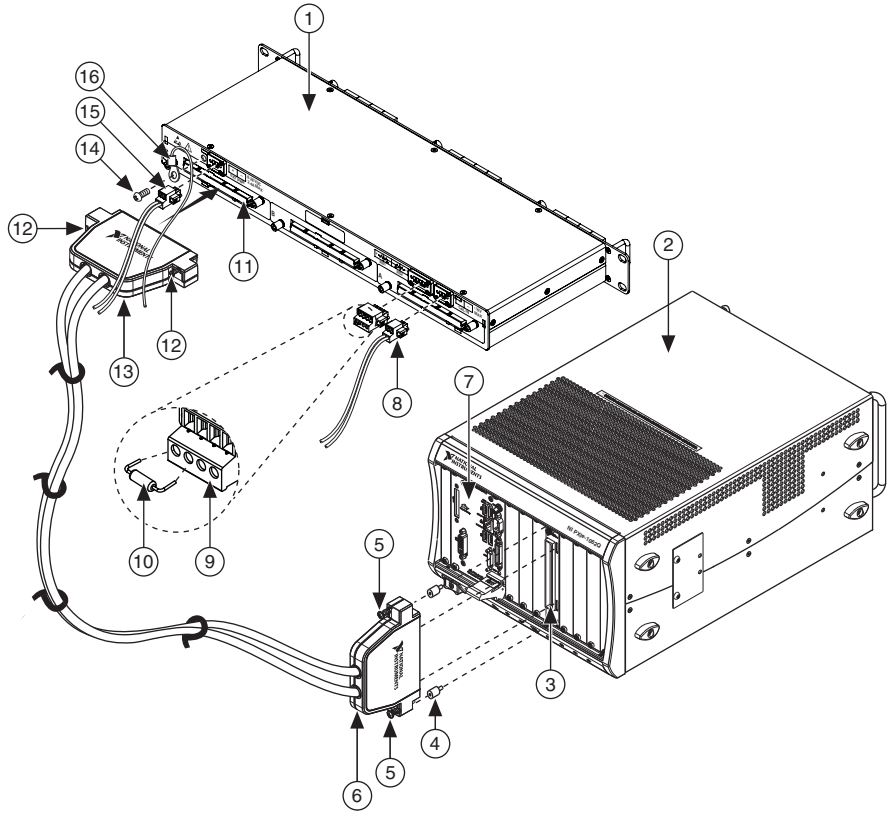
1	Rack-Mounting Screws (4)	4	Wide Bandwidth Analog Output 9-Pin D-SUB Cable*
2	RM-4339 Rack-Mount Terminal Block	5	SCAL-4339 Shunt Calibration Accessory
3	PFI BNC Cable	6	RJ50 (8) Cable Connectors

* Refer to the *NI PXIe-4339 User Manual* for more information regarding wide bandwidth analog output.

To install the cables in any of positions A, B, and/or C, complete the following steps while referring to Figures 3 and 4.

1. Connect the RJ50 cable connectors to the appropriate RJ50 connector receptacles for the position being used. Refer to the *RJ50* section for more information.
2. Make any of the following connections as needed for your application:
   - Connect the BNC cable to the PFI0 receptacle.
   - Connect the SCAL-4339 to the 25-pin D-SUB receptacle.
   - Connect the 9-pin D-SUB connector to the 9-pin D-SUB wide bandwidth analog output receptacle.
   - Connect the external power source.
     a. Remove the 2-pin EXT PWR connector from the RM-4339.
     b. Install the external power wires. Refer to the *EXT PWR* section for more information.
     c. Install the 2-pin COMBICON cable into the RM-4339.
   - Connect calibration input.
     a. Remove the 2-pin COMBICON connector from the RM-4339.
     b. Install the calibrator input wires. Refer to the *In-Situ Calibration* section for more information.
     c. Install the 2-pin COMBICON cable into the RM-4339.
   - Connect the calibration bias resistors.
     a. Remove the 4-pin COMBICON connector from the RM-4339.
     b. Install the bias resistors. Refer to the *CAL IN* section for more information.
     c. Install the 4-pin COMBICON cable into the RM-4339.
3. Connect the chassis ground wire to the chassis ground screw.

Figure 4. Cables, Resistor, and Standoff Installation



1	RM-4339 Rack-Mount Terminal Block	9	Calibration Bias Resistor Connector 4-position COMBICON
2	PXIe Chassis	10	Bias Resistor
3	NI PXIe-4339 Module	11	RM-4339 Connector Receptacle
4	Standoffs (2)	12	Jack Screws (2x)
5	Jack Screws (2x)	13	SH96-96-2 Cable RM-4339 Connector Plug (male)
6	SH96-96-2 Cable RM-4339 Connector Plug (female)	14	Chassis Ground Screw
7	PXIe Controller	15	External Power 2-Position COMBICON Cable
8	Calibration Input 2-Position COMBICON Cable	16	Chassis Ground Cable

4. Screw the two standoffs into the NI PXIe-4339 module. Tighten the standoffs to 1.30 N · m (11.5 lb · in.).
5. Connect the male end of the SH96-96-2 cable to the RM-4339 and tighten the two jack screws to 0.90 N · m (8.0 lb · in.).

Note For safety purposes and to prevent damage to equipment when high voltages are present, the SH96-96-2 cable is keyed to prevent connection between incompatible terminal blocks, modules, and/or cables.

6. Connect the female end of the SH96-96-2 cable to the NI PXIe-4339 and tighten the two jack screws to 0.90 N · m (8.0 lb · in.).

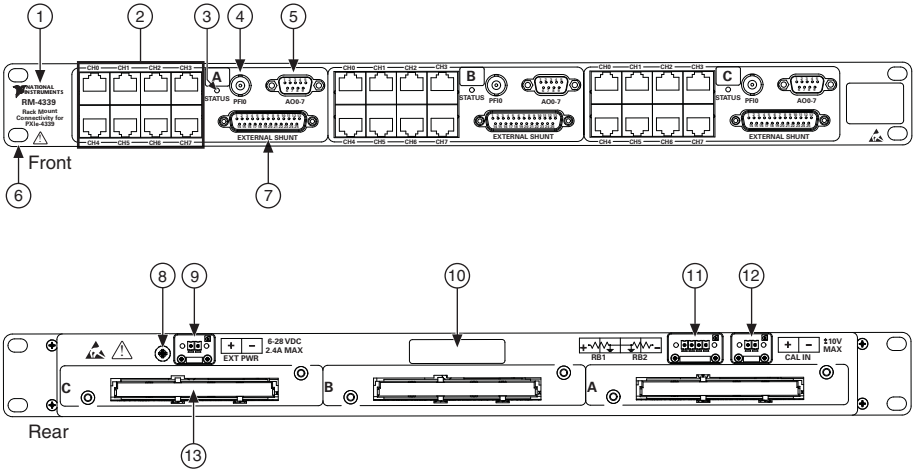
Note For information about sensors, go to `ni.com/sensors`.

7. Power on the PXIe chassis if it is powered off.

RM-4339 Positions

The RM-4339 is divided into three positions A, B, and C. You can connect three separate NI PXIe-4339 modules simultaneously to the RM-4339; one to each position. Each of the three positions is independently controlled and powered by the NI PXIe-4339 to which it connects. There are no constraints on how many or which positions are used. On the rear side of the RM-4339, the three 96-pin DIN connectors are labeled A, B, and C. These correspond to the three connector sets on the front of the RM-4339, which are also labeled A, B, and C. Connectors within one of these positions connect to the same NI PXIe-4339 module. Figure 5 shows the location of the connectors on the front and rear of the RM-4339.

Figure 5. RM-4339 Front and Rear View



1	RM-4339 Product Name	8	Chassis Ground
2	RJ50 Connector (8 per position)	9	External Power 2-position COMBICON
3	LED Status Indicator (1 per position)	10	Serial Number Label
4	PFI0 (1 per position)	11	Calibration Bias Resistor Connector 4-position COMBICON
5	Wide Bandwidth AO 9-Pin D-SUB (1 per position)	12	Calibration Input 2-position COMBICON
6	Mounting Flanges (2x)	13	96-Pin DIN Cable Connector (1 per position)
7	External Shunt 25-Pin D-SUB (1 per position)		

Shared Resources

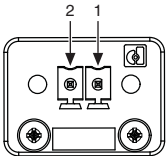
The CAL IN, BIAS RESISTOR and EXT PWR connectors on the rear of the RM-4339 are shared by positions A, B, and C.

CAL IN

The CAL IN input connector on the rear of the RM-4339 allows you to connect a voltage reference that can be internally routed to the analog input of each channel (AI+, AI-) on the NI PXIe-4339. You can independently configure each channel in any position of the RM-4339 to connect to CAL IN using the Calibration API within NI-DAQmx.

The calibration source voltage is connected to the CAL IN+ and CAL IN- terminals as shown in Table 1.

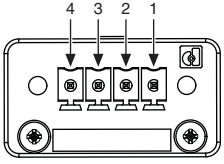
Table 1. Calibration Input Connector Pin Assignments

Calibration Input Pin Diagram	Pin	Signal Name	Signal Description
	1	CAL IN-	Calibration input negative
	2	CAL IN+	Calibration input positive

CAL BIAS

You can use the connector labeled RB1 and RB2 on the rear of the RM-4339 to reference the CAL± input to analog ground (AIGND). For flexibility, access to both CAL+ and CAL- is provided. The CAL BIAS+ pin connects to CAL+ and the CAL BIAS- pin connects to CAL-. You can reference a floating voltage to AIGND by populating the RB1 position. To provide a differential voltage that is referenced to AIGND with zero common mode, populate both RB1 and RB2 with equal value resistors. When choosing resistor values, consider the output impedance of the external reference voltage source.

Table 2. Bias Resistor Connector

Bias Resistor Connector	Pin	Signal Name	Signal Description
	1	CAL BIAS-	RB2 calibration bias resistor for CAL-
	2	AIGND	Analog input ground
	3	AIGND	Analog input ground
	4	CAL BIAS+	RB1 calibration bias resistor for CAL+

In-Situ Calibration

The RM-4339 provides the ability to perform in-situ calibration of input channels referenced to an external traceable voltage source that you can use to connect to the CAL IN connector. In-situ calibration offers a means to determine measurement errors and uncertainties compared to a traceable standard. The calibration data can be used to compensate for changes in the hardware,

resulting in a more accurate measurement. In-situ calibration can be performed before and after test acquisition, or on a periodic schedule, to ensure data validity without physically disconnecting any inputs from the RM-4339.

During in-situ calibration, the input channels are disconnected internally from the RJ50 connectors and connected to a calibration bus that is driven by the calibration voltage reference connected to CAL IN±. Through measurement of these channels, any NI PXIe-4339 circuitry drift since the last full calibration will be available through measurement of these channels. In-situ calibration performs a verification, but not an adjustment. Therefore, the results from in-situ calibration will not rewrite the calibration coefficients to the NI PXIe-4339. Instead these results can be applied to the test setup, test results, or to the NI PXIe-4339 programmatically.

To assist you with starting development of an application with in-situ calibration, an example program is available for download from the NI Community. Refer to `ni.com/info` and enter Info Code `exsueg`.

For in-situ calibration, the following connection options are supported through NI-DAQmx as shown in Table 3.

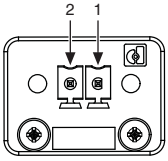
Table 3. Per-Channel Connection Options Configurable Through NI-DAQmx Connect SC Express Calibration Accessory Channels API

Connection Option	Purpose
`_cal_channel`	Connect a voltage reference provided through CAL IN to the analog input of each channel.
`_remote_sense_floating`	Disconnect RS+/RS-. This option is used during in-situ calibration of a ratio mode channel. It is used to disconnect the remote sense of the NI PXIe-4339 module from a connected bridge sensor. A gain error in the in-situ calibration of a ratio mode channel will result if remote sense is not disconnected. The magnitude of the gain error is proportional to the ratio of the lead wire resistance and the connected sensors resistance.
`_disconnect_excitation`	Disconnect EX+/EX-. This option is used during in-situ calibration of a ratio mode channel. It is used to disconnect the excitation voltage of the NI PXIe-4339 module from a connected bridge sensor. Disconnecting the excitation from a connected sensor allows ratio mode in-situ calibration to be conducted with all the supported excitation voltage settings regardless of the load connected to a channels excitation terminals.
Note: In-situ calibration of ratio mode channels requires the use of paired channels. Refer to the verification section of the *NI PXIe-4339 Calibration Procedure* for more information about configuring the NI PXIe-4339 for ratio mode calibration.	

EXT PWR

The external power input connector on the rear of the RM-4339 allows you to connect a positive voltage supply for use in powering powered sensors. The external voltage source can be either ground referenced or floating. The EXT PWR- input is connected to the ground of the RM-4339. Do not apply a ground referenced voltage to the EXT PWR- input; doing so can result in excessive current conducted through the ground of the RM-4339. The RM-4339 internally routes the voltage connected to EXT PWR+ to positions A, B, and C. There is an enable switch per position followed by a positive temperature coefficient (PTC) resistor for protection against short-circuit faults. The EXT PWR per-position enable switches are off by default and are automatically enabled by NI-DAQmx when a channel is configured to use external excitation. Refer to Table 4 for signal names and descriptions.

Table 4. External Power Connector Pin Assignments

External Power Connector Pin Diagram	Pin	Signal Name	Signal Description
	1	EXT PWR- (GND)	Ground
	2	EXT PWR+	External power

After connecting EXT PWR to a powered sensor, a short time delay may need to be introduced in the measurement application to allow the sensor to warm up. Refer to your powered sensor documentation for any power up settling requirements.

Excitation/External Power

Each channel includes switching that allows EXT PWR to be connected to the EX± pins of each RJ50 connector. When connected, EX+ is connected to EXT PWR+ and EX- is connected to the ground of the RM-4339. You can configure each channel independently to either connect to EXT PWR, to the excitation voltage provided by the NI PXIe-4339, or to not be connected to any reference (floating).

The EX± pins of each RJ50 connector are connected to the corresponding NI PXIe-4339 excitation channel by default and are only connected to the EXT PWR while a NI-DAQmx task is running with the channel configured to use the EXT PWR resource.

When the task has finished running, EX± returns to the default position.

Current Fault Protection Reset

The positive temperature coefficient (PTC) resistors used for short circuit fault protection trip by undergoing a large, abrupt change in resistance in response to an overcurrent. The tripped state of the PTC is a latched state that is sustained by a small self-heating current. To reset the PTC, the fault must be removed and all the current through the PTC must be momentarily interrupted from the position (A, B, C) that the faulted channel was part of. After removal of the

fault, interruption of the current can be done by programmatically disconnecting EXT PWR from the appropriate position by stopping the tasks that are using EXT PWR+. The following three steps summarize the steps that should be taken to reset a tripped PTC:

1. Remove the short-circuit fault from the affected channel.
2. Programmatically disconnect EXT PWR from the position of which the faulted channel was a part.
3. After 10 seconds, programmatically reconnect EXT PWR.

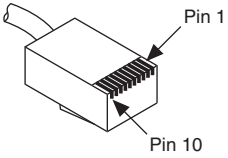
Position Resources

This section describes the position resources on both the front and rear of the RM-4339. Figure 5 shows the locations of these resources.

RJ50

Refer to Table 5 for signal names and descriptions, and the correlation to the pin numbers of the RJ50 (10p10c) modular plug. Refer to Figure 8 for default switch positions.

Table 5. RJ50 Connector Pin Assignments

RJ50* (10p10c) Modular Plug Pin Number Diagram	Pin	Signal Name	Signal Description
	1	SCA	Shunt calibration A circuit connection. Pin 1 and pin 10 form a pair of terminals used to provide connectivity to a shunt calibration resistor. The source of the resistor can be the SCA built-in resistor or a user provided resistor installed in the SCAL-4339 accessory.
	2	AI+	Positive input signal—connected to the AI+ input of the NI PXIe-4339 or disconnected when the channel is connected to CAL_IN+.
	3	AI-	Negative input signal—connected to the AI- input of the NI PXIe-4339 or disconnected when the channel is connected to CAL_IN-.
	4	RS+	Positive remote sense signal—connected to the RS+ input of the NI PXIe-4339. This pin can also be disconnected internally on the RM-4339.
	5	QTR/ RS-	Quarter-bridge completion—negative remote sense signal—when using the quarter-bridge mode of the RM-4339 this pin connects to the quarter-bridge completion resistor on the RM-4339. In other measurement modes it connects to the RS- input of the NI PXIE-4339. This pin can also be disconnected internally on the RM-4339.
	6	EX+	Positive excitation—voltage source of the NI PXIe-4339 (default) or an external voltage source for use with powered sensors. This pin can also be disconnected internally on the RM-4339.
	7	EX-	Negative excitation—voltage source of the NI PXIe-4339 (default) or ground when configured for external power. This pin can also be disconnected internally on the RM-4339.
	8	T+	TEDS—sensor digital communication line.
	9	T-	Negative reference for TEDS communication. Internally connected to digital ground of the RM-4339.
	10	SCA	Shunt calibration A circuit connection. Paired with pin 1 to provide connectivity to shunt calibration resistors.

* NI does not recommend using an RJ45 cable with the RM-4339 as it can physically damage pins 1 and 10 on the RJ50 connector.
Note: Refer to Figure 8 for default positions.

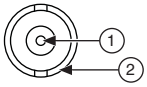
Status LED

The green status LED, when lit, indicates a position is connected to a powered NI PXIe-4339 module. The location of the Status LED is shown in Figure 5.

PFI0

The PFI0 connector provides a female BNC connection to the PFI trigger line of the NI PXIe-4339. The RM-4339 passes this signal directly through. Refer to the *NI PXIe-4339 User Manual* for more information about using the PFI trigger line. Refer to Table 6 for signal names and descriptions.

Table 6. BNC Connector Pin Assignments

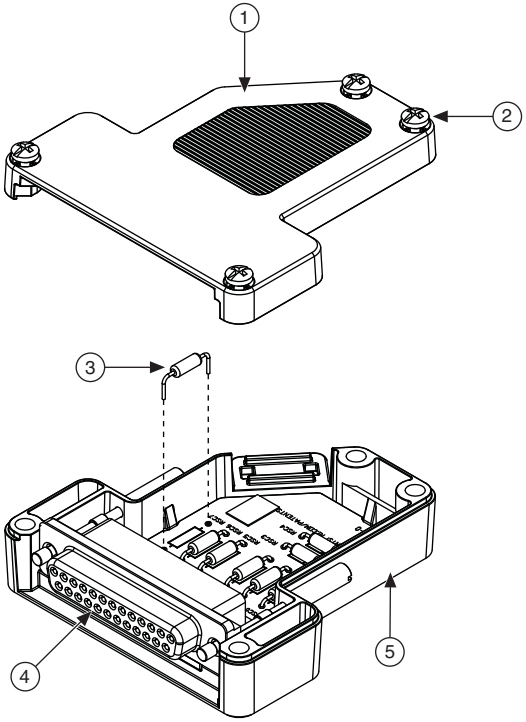
BNC PFI0 Connector Pin Diagram	Pin	Signal Name	Signal Description
	1	PFI0	PFI input
	2	DGND	Digital ground

External Shunt

The 25-pin D-SUB connector is used to attach the optional SCAL-4339 Shunt Calibration Accessory.

The SCAL-4339 Shunt Calibration Accessory allows a user to provide an external shunt calibration resistor in place of the built-in 100 kΩ SCA shunt calibration resistor. Through software configuration, the user provided resistors on the SCAL-4339 Shunt Calibration Accessory can be connected to the SCA terminal pairs of the RJ50 connectors. Eight pairs of through hole sockets are provided on the SCAL-4339 Shunt Calibration Accessory for installing the user provided resistors. Figure 6 illustrates opening the SCAL-4339 and installing resistors.

Figure 6. Opening the SCAL-4339 and Inserting Shunt Calibration Resistor

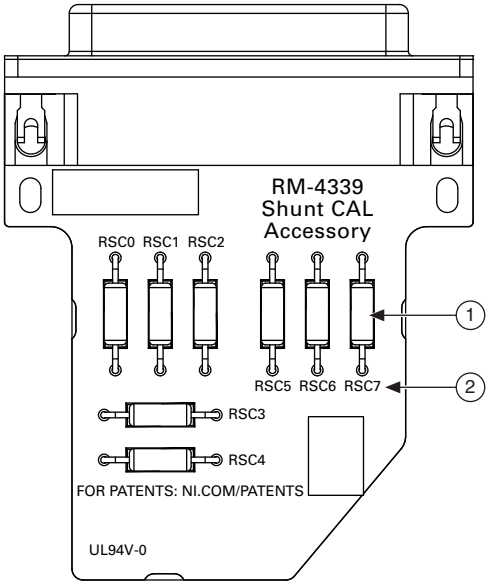


1	Top Cover	4	25-Pin D-SUB Connector
2	Captive Screws (4x)	5	SCAL-4339 Case
3	Shunt Calibration Resistor (8x user supplied)		

Refer to the *Mechanical* section for information about the required resistor lead diameter, spacing, and depth.

The socket pairs are labeled RSC*X*, where *X* represents the channel number. For example, RSC0 corresponds to channel 0. Refer to Figure 7 for a detailed illustration.

Figure 7. SCAL-4339 Resistor Locations

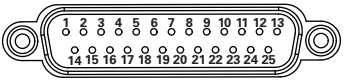


1	Shunt Resistor—User Supplied (8x)	2	Channel Names (RSC*X*)

The use of the SCAL-4339 Shunt Calibration Accessory does not prevent the built-in SCA resistor on the RM-4339 from being used, however the built-in resistor and the user provided resistor cannot be selected simultaneously.

Refer to Table 7 for signal names and descriptions.

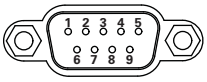
Table 7. 25-Pin D-SUB External Shunt Connector Pin Assignments

25-Pin D-SUB External Shunt Pin Number Diagram	Pin Pairings	Signal Name	Signal Description
	1, 14	SCA0	Shunt calibration A channel 0
	2, 15	SCA1	Shunt calibration A channel 1
	3, 16	SCA2	Shunt calibration A channel 2
	4, 17	SCA3	Shunt calibration A channel 3
	5, 18	SCA4	Shunt calibration A channel 4
	6, 19	SCA5	Shunt calibration A channel 5
	7, 20	SCA6	Shunt calibration A channel 6
	8, 21	SCA7	Shunt calibration A channel 7
	9..13, 22..25	NC	No connect

AO 0..7

The AO 0..7 connector is a 9 pin D-SUB connector that allows connection to the 8 wide bandwidth analog output signals generated by the NI PXIe-4339. The RM-4339 passes these signals directly through the terminal block. Refer to Table 8 for signal names and descriptions.

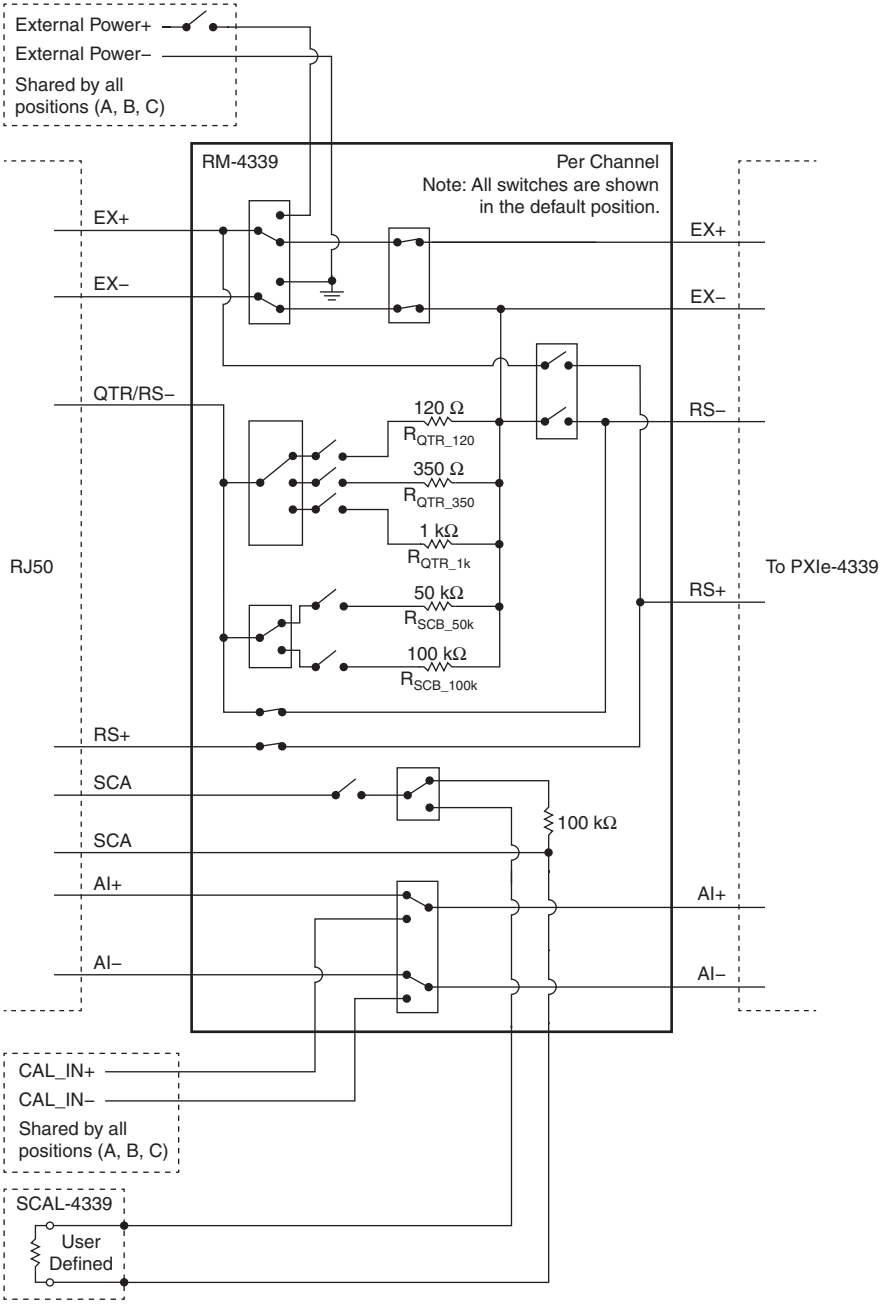
Table 8. 9-Pin D-SUB Connector Pin Assignments

9-Pin D-SUB Analog Output Pin Number Diagram	Pin	Signal Name	Signal Description
	1	AO0+	Analog output channel 0
	2	AO1+	Analog output channel 1
	3	AO2+	Analog output channel 2
	4	AO3+	Analog output channel 3
	5	AO4+	Analog output channel 4
	6	AO5+	Analog output channel 5
	7	AO6+	Analog output channel 6
	8	AO7+	Analog output channel 7
	9	AOGND	Analog output ground

Position Switching

The RM-4339 provides software controlled switching to allow you to programmatically control the additional features the RM-4339 adds to the NI PXIe-4339. Each of the three positions is independently controlled by its corresponding NI PXIe-4339. Within a single position, each channel can be configured independently through NI-DAQmx. Figure 8 illustrates the switching provided for each channel.

Figure 8. RM-4339 Switching Configurations



Quarter-Bridge Completion and Shunt Calibration

The RM-4339 provides software selectable quarter-bridge completion resistors that enable the NI PXIe-4339 to be used with quarter-bridge strain gages. You can select 120 Ω, 350 Ω or 1 kΩ completion resistors.

Quarter-bridge shunt calibration resistors are also provided on the RM-4339. These resistors are labeled SCB_50k and SCB_100k in the switch circuit diagram of Figure 8. There are two different shunt calibration resistance values that you can select; 50 kΩ and 100 kΩ. The quarter-bridge shunt calibration resistors are dedicated to the quarter-bridge completion resistors and are selectable through NI-DAQmx. NI recommends using the 50 kΩ shunt calibration resistor for shunt calibration of 120 Ω quarter-bridge strain gages and using the 100 kΩ shunt calibration resistor for 350 Ω and 1 kΩ quarter-bridge strain gages.

If quarter-bridge completion is not used, the QTR/RS- pin of the RJ50 connector is connected to the RS- pin of the NI PXIe-4339. Refer to the *NI PXIe-4339 User Manual* for more information about quarter-bridge measurements.

You can access SCB_50k and SCB_100k using NI-DAQmx attributes/properties.

LabVIEW property names and locations:

- AI.Bridge.ShuntCal.ShuntCalBResistance
- Location: **AI»General Properties»Signal Conditioning»Bridge»ShuntCal»Shunt Cal B Resistor Value**
- AI.Bridge.ShuntCal.ShuntCalBActualResistance
- Location: **AI»General Properties»Signal Conditioning»Bridge»Shunt Cal B Actual Resistor Value**

Shunt Resistors

The RM-4339 provides built-in 100 kΩ shunt resistors that can be programmatically connected to the SCA terminal pairs on the RJ50 connectors. In addition you can use the optional SCAL-4339 Shunt Calibration Accessory to provide user provided shunt calibration resistors to the SCA terminals of each channel. Refer to the *External Shunt* section for more information. Refer to Table 7 for signal names and descriptions.

You can choose between built-in 100 kΩ resistors and external user provided resistors using an NI-DAQmx channel attribute/property.

LabVIEW property names and locations:

- AI.Bridge.ShuntCal.ShuntCalASrc
- Location: **AI»General Properties»Signal Conditioning»Bridge»ShuntCal»Shunt Cal A Source**
- Possible values: BuiltIn or UserProvided

Note The RM-4339 SCA pins on the RJ50 are not connected to the SCA pins on the NI PXIe-4339. Refer to the *NI PXIe-4339 User Manual* for more information about shunt calibration.

For more info about getting started with shunt calibration, including how to use external shunt resistors with the SCAL-4339 Shunt Calibration Accessory, refer to `ni.com/info` and enter Info Code `exxtvn`.

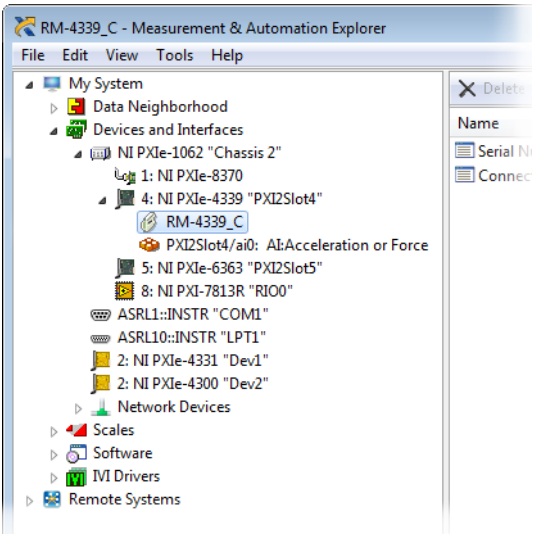
Confirm SC Express Module Recognition

To confirm module recognition, complete the following steps:

Note Software support for the NI PXIe-4339 is provided by NI-DAQmx. The DAQ Getting Started Guide, which you can download at `ni.com/manuals`, offers step-by-step NI-DAQmx instructions for installing software and hardware, configuring channels and tasks, and getting started developing an application. For detailed NI software version support, refer to the *NI-DAQmx Readme*.

1. Launch MAX.

2. Expand **Devices and Interfaces**, and expand the chassis in which the module is located to confirm that MAX detects the module and terminal block. The terminal block should appear beneath its associated module. If your module or terminal block is not listed, press <F5> to refresh MAX. If the module is still not recognized, go to `ni.com/support/daqmx`.



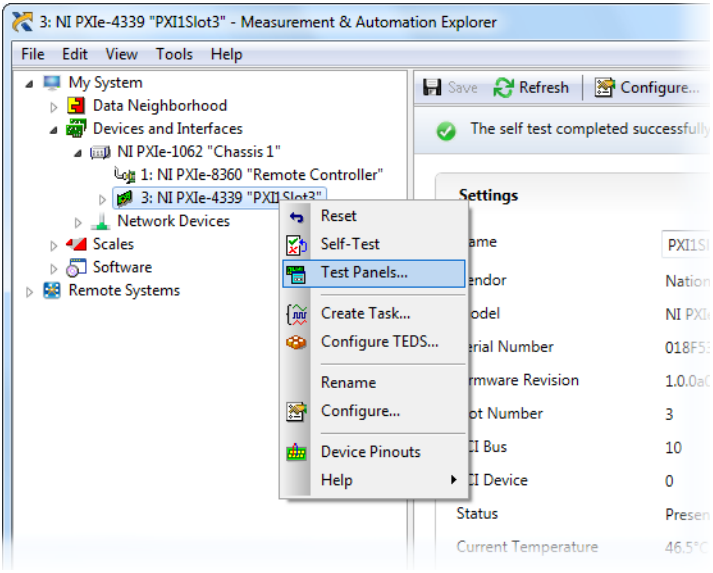
Tip Using an NI-DAQmx simulated device, you can test NI-DAQmx applications without installing hardware. Refer to the *Create a Simulated Device* section for instructions for creating NI-DAQmx simulated devices.

3. Right-click the module name and select **Self-Test**. When the self-test completes, a verification message appears. If an error occurs, refer to `ni.com/support/daqmx`.

For information about sensors, go to `ni.com/sensors`.

Run Test Panels

1. In MAX, expand **Devices and Interfaces** select the chassis in which the module is located.
2. Right-click the device, and select **Test Panels**.



3. Click **Start** to test device functions, or **Help** for operating instructions.

To troubleshoot errors, refer to the *NI-DAQmx Help*, or go to `ni.com/support`.

Take an NI-DAQmx Measurement

NI-DAQmx Channels and Tasks

Refer to the *NI-DAQmx Help* for complete information about channels and tasks.

Use the DAQ Assistant to configure virtual channels and tasks in MAX or in your application.

Configure a Task Using the DAQ Assistant in MAX

Complete the following steps to create a task using the DAQ Assistant in MAX:

1. In MAX, right-click **Data Neighborhood** and select **Create New** to open the DAQ Assistant.
2. Select **NI-DAQmx Task** and click **Next**.
3. Select **Acquire Signals**.
4. Select **Analog Input**, and the measurement type, such as **Strain**.
5. Select the physical channel(s) to use and click **Next**.

6. Name the task and click **Finish**.
7. Configure the individual channel settings. Each physical channel you assign to a task receives a virtual channel name. To modify the input range or other settings, select the channel. Click **Details** for physical channel information. Configure the timing and triggering for your task. Click **Run**.

Use Your NI SC Express Device in an Application

For NI software version compatibility, refer to the NI-DAQmx Readme, available from **Start» All Programs»National Instruments»NI-DAQmx**.

To get started with data acquisition in your application software, refer to the tutorials listed in Table 9.

Table 9. DAQ Assistant Tutorial Locations

Application	Tutorial Location
LabVIEW	Go to **Help»Search the LabVIEW Help**. Next, go to **Getting Started with LabVIEW»Getting Started with DAQ»Taking an NI-DAQmx Measurement in LabVIEW**.
LabWindows/CVI	Go to **Help»Contents**. Next, go to **Using LabWindows/CVI»Data Acquisition» Taking an NI-DAQmx Measurement in LabWindows/CVI**.
Measurement Studio	Go to **NI Measurement Studio Help»Getting Started with the Measurement Studio Class Libraries»Measurement Studio Walkthroughs»Walkthrough: Creating a Measurement Studio NI-DAQmx Application**.
LabVIEW SignalExpress*	Go to **Help»Taking an NI-DAQmx Measurement in SignalExpress**.
* LabVIEW SignalExpress, an easy-to-use configuration-based tool for data logging applications, is at **Start»All Programs»National Instruments»LabVIEW SignalExpress**.	

Programming Examples

NI-DAQmx includes example programs to help you get started developing an application. LabVIEW and CVI examples are located at **Help»Find Examples** in your application software. Text-based code examples are located at **All Programs»National Instruments»NI-DAQ» Text-Based Code Support»ANSI C Examples**. Modify example code and save it in an application, or use examples to develop a new application or add example code to an existing application.

For other examples, go to `ni.com/info` and enter the Info Code `daqmxexp`. For additional examples, refer to `zone.ni.com`.

Removal

Terminal Block and Cables Removal

To remove the RM-4339 and NI PXIe-4339, complete the following steps while referring to Figures 3 and 4:

Note The chassis can be powered on or off when removing the terminal block.

1. Remove the RJ50 connector cables from the terminal block.
2. Remove any of the following connections as needed for your application:
   - Disconnect the BNC cable from the PFI0 receptacle.
   - Disconnect the SCAL-4339 from the 25-pin D-SUB receptacle.
   - Disconnect the 9-pin D-SUB connector from the 9-pin D-SUB wide bandwidth analog output receptacle.
   - Disconnect the 2-pin COMBICON external power connector from the external power receptacle.
   - Disconnect the 2-pin COMBICON calibration input connector from the calibrator input receptacle.
   - Disconnect the 4-pin calibration bias resistor connector from the 4-pin bias resistor receptacle.
3. Loosen the four jack screws and remove the SH96-96-2 cable from the terminal block and the module.

Note If required for your application, remove the two standoffs from the module.

4. While supporting the terminal block, remove the four rack-mounting screws.
5. Remove the terminal block from the rack.
6. Store the terminal block in an antistatic protective bag.

Module Removal

Caution Do *not* remove a module with the PXIe chassis powered on. Doing so can damage the module.

To remove the NI PXIe-4339 module, refer to Figure 9 while completing the following steps:

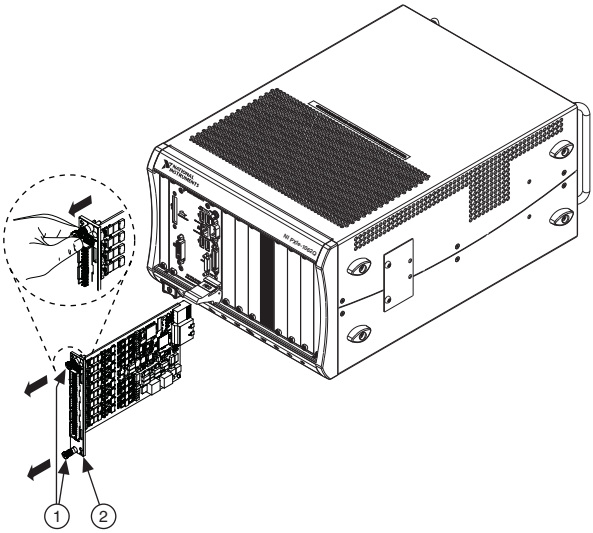
Note To maintain forced air cooling in the PXIe system, refer to the *Maintain Forced-Air Cooling* document.

1. Make sure that the chassis is powered off before removing the module.
2. Loosen the captive screws on the top and bottom of the module.

Caution Do *not* pull the front panel to remove the module. Doing so may cause module components to come into contact with adjacent modules, causing damage to the modules.

3. Pull the captive screws to unseat the module and slowly slide the module along the guides.
4. Replace the filler panel in the empty slot.
5. Store the module in an antistatic protective bag.

Figure 9. Removing NI SC Express Modules



1 Captive Screws (Use to remove modules.) 2 Front Panel (Do not use to remove modules.)

Create a Simulated Device

To run examples without the hardware installed, use an NI-DAQmx simulated device. To create a simulated device in MAX:

1. Launch MAX.
2. Right-click **Devices and Interfaces»Create New**.
3. From the dialog, select **Simulated NI-DAQmx Device or Modular Instrument**.
4. Type `4339` in the text box at the top of the window.
5. Select the device from the list provided.
6. Click **OK**.
7. To simulate an accessory:
   a. Right-click the simulated NI PXIe-4339>>Configure...
   b. Select the Accessory from the Connector 0 drop down.
   c. Click **OK**.

More Information

After you install NI-DAQmx, the NI-DAQmx documentation is available from **Start» All Programs»National Instruments»NI-DAQ**. Additional resources are online at `ni.com/gettingstarted`.

You can access online device documentation by right-clicking your module in MAX and selecting **Help»Online Device Documentation**. A browser window opens to `ni.com/manuals` with the results of a search for relevant documents. If you do not have Web access, documents for supported modules are included on the NI-DAQmx media.

Troubleshooting

- Go to `ni.com/support/install` or `ni.com/kb`.
- If you need to return your National Instruments hardware for repair or device calibration, go to `ni.com/info` and enter `rdsenn` to start the Return Merchandise Authorization (RMA) process.

Specifications (RM-4339)

Note NI PXIe-4339 module specifications are located in the *NI PXIe-4339 Specifications* document.

All specifications are typical for the range of 0 °C to 55 °C unless otherwise specified.

Electrical

Input voltage range ..... Refer to the *NI PXIe-4339 Specifications* document.

Input Characteristics

Number of channels ..... 8 analog input channels per position (A, B, C)

AI± differential input

Range ..... Refer to the *NI PXIe-4339 Specifications* document

Offset voltage[1] ..... 10 µV max @ 23 °C ±5 °C
2 µV typ @ 23 °C ±5 °C

Offset voltage stability ..... 0.5 µV/°C max
0.05 µV/°C

AI± to CAL± offset matching ..... 1.2 µV

[1] The offset voltage specification of the RM-4339 is an additional offset error that should be added to the offset error of the NI PXIe-4339 to determine the total system offset error.

Bridge Completion

Quarter-bridge completion

- Values ..... 120 Ω, 350 Ω, 1 kΩ
- Tolerance
  - 120 Ω ..... 0.25% max @ 23 °C ±5 °C
  - 350 Ω and 1 kΩ ..... 0.15% max @ 23 °C ±5 °C
- Stability
  - 120 Ω ..... 15 ppm/°C max
  - 350 Ω and 1 kΩ ..... 12 ppm/°C max

Quarter-bridge shunt calibration resistors (SCB)

- Values ..... 50 kΩ, 100 kΩ
- Tolerance ..... 0.1% max @ 23 °C ±5 °C
- Stability ..... 10 ppm/°C max

Shunt calibration resistors (SCA)

- Values ..... 100 kΩ or user provided through SCAL-4339
- Tolerance ..... 0.1% max @ 23 °C ±5 °C
- Stability ..... 10 ppm/°C max
- SCA switch resistance ..... 2 Ω

External Power (EXT PWR)

Voltage range ..... 6 V to 28 V single ended

Current rating ..... 2.4 A max
100 mA per EX+

Path resistance ..... 0.7 Ω
(EXT PWR to EX+ channel)

Protection ..... Short circuit protected per position (A, B, C)

- Protection type ..... Positive temperature coefficient (PTC) resistor

Mechanical

RJ50 receptacle

- Mean number of insertions before failure 500

Channel configuration switches

- Switch type ..... Electromechanical relay, latching
- Expected switch life
  - Mechanical ..... 5×10^7 cycles
  - Electrical ..... 2×10^5 cycles

SCAL-4339 Accessory

Resistor sockets

Pin diameter ..... 0.6 to 0.7 mm (0.023 to 0.026 in.)

Mating hole depth ..... 2.8 to 4.4 mm (0.110 to 0.175 in.)

Hole spacing ..... 12.7 mm (0.500 in.)

Connectors

RJ50 24

9-pin D-SUB 3

25-pin D-SUB 3

BNC 3

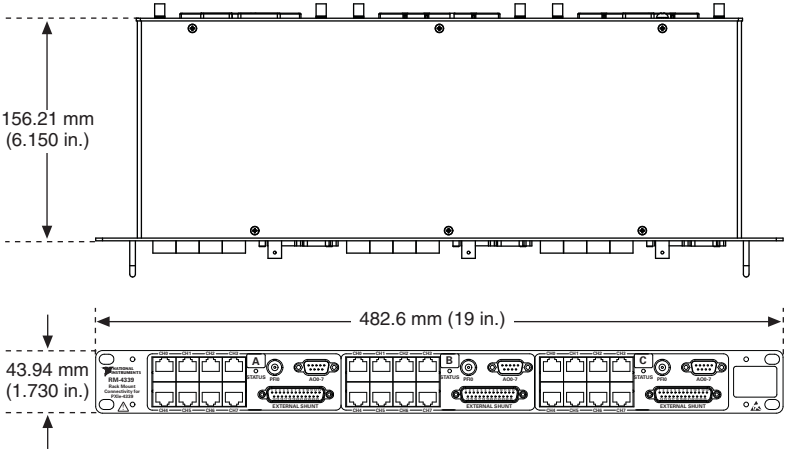
96-pin DIN 3

COMBICON 2 position 2

COMBICON 4 position 1

Physical

Figure 10. RM-4339 Dimensions



Weight ..... 1867 g (65.9 oz)

Caution Clean the hardware with a soft, nonmetallic brush. Make sure that the hardware is completely dry and free from contaminants before returning it to service.

Environmental Specifications

Maximum altitude ..... 2,000 m (800 mbar), at 25 °C ambient temperature

Pollution Degree 2

Indoor use only

Operating Environment

Ambient temperature range ..... 0 °C to 55 °C
(Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2. Meets MIL-PRF-28800F Class 3 low temperature limit and MIL-PRF-28800F Class 2 high temperature limit.)

Relative humidity range ..... 10% to 90%, noncondensing
(Tested in accordance with IEC 60068-2-56.)

Storage Environment

Ambient temperature range ..... -40 °C to 71 °C
(Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2. Meets MIL-PRF-28800F Class 3 limits.)

Relative humidity range ..... 5% to 95%, noncondensing
(Tested in accordance with IEC 60068-2-56.)

Shock and Vibration

Operating shock ..... 30 g peak, half-sine, 11 ms pulse
(Tested in accordance with IEC 60068-2-27. Meets MIL-PRF-28800F Class 2 limits.)

Random vibration

- Operating ..... 5 Hz to 500 Hz, 0.3 g_{rms}
- Non-operating ..... 5 Hz to 500 Hz, 2.4 g_{rms}

(Tested in accordance with IEC 60068-2-64. Non-operating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)

Safety

Measurement Category..... I[1]

Caution Do *not* connect the RM-4339 to signals or use for measurements within Measurement Categories II, III or IV.

Caution The protection provided by the RM-4339 can be impaired if it is used in a manner not described in this document.

Safety Standards

This product meets the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1

Note For UL and other safety certifications, refer to the product label or the *Online Product Certification* section.

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326-1 (IEC 61326-1): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- EN 55022 (CISPR 22): Class A emissions
- EN 55024 (CISPR 24): Immunity
- AS/NZS CISPR 11: Group 1, Class A emissions
- AS/NZS CISPR 22: Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions

Note In the United States (per FCC 47 CFR), Class A equipment is intended for use in commercial, light-industrial, and heavy-industrial locations. In Europe, Canada, Australia and New Zealand (per CISPR 11) Class A equipment is intended for use only in heavy-industrial locations.

[1] Measurement Categories CAT I and CAT O are equivalent. These test and measurement circuits are not intended for direct connection to the MAINS building installations of Measurement Categories CAT II, CAT III, or CAT IV.

Note Group 1 equipment (per CISPR 11) is any industrial, scientific, or medical equipment that does not intentionally generate radio frequency energy for the treatment of material or inspection/analysis purposes.

Note For the standards applied to assess the EMC of this product, refer to the *Online Product Certification* section.

CE Compliance CE

This product meets the essential requirements of applicable European Directives as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)

Online Product Certification

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for this product, visit `ni.com/certification`, search by model number or product line, and click the appropriate link in the Certification column.

Environmental Management

NI is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to NI customers.

For additional environmental information, refer to the *Minimize Our Environmental Impact* web page at `ni.com/environment`. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

Waste Electrical and Electronic Equipment (WEEE)

EU Customers At the end of the product life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers, National Instruments WEEE initiatives, and compliance with WEEE Directive 2002/96/EC on Waste and Electronic Equipment, visit `ni.com/environment/weee`.

电子信息产品污染控制管理办法 （中国 RoHS）

中国客户 National Instruments 符合中国电子信息产品中限制使用某些有害物质指令 (RoHS)。关于 National Instruments 中国 RoHS 合规性信息，请登录 `ni.com/environment/rohs_china`。 (For information about China RoHS compliance, go to `ni.com/environment/rohs_china`.)

World Wide Support and Services

The National Instruments website is your complete resource for technical support. At ni.com/support you have access to everything from troubleshooting and application development self-help resources to email and phone assistance from NI Application Engineers.

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Visit ni.com/register to register your National Instruments product. Product registration facilitates technical support and ensures that you receive important information updates from NI.

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